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# MILLER ENGINEERING & TESTING, INC.

Proposal for  
Subsurface Investigation,  
Geotechnical Engineering Services,  
and  
Environmental Site Assessment

CHINATOWN PARCEL B  
Boston, MA



MILLER ENGINEERING & TESTING, INC.

100 SHEFFIELD RD. • P.O. BOX 4776 • MANCHESTER, NH 03108 • TEL (603) 668-6016 • FAX (603) 668-8641  
GEOTECHNICAL / SOIL BORINGS / ENVIRONMENTAL / CONCRETE / STEEL / ROOFING / ASPHALT INSPECTION

NEW HAMPSHIRE • MASSACHUSETTS • MAINE



Proposal for  
Subsurface Investigation,  
Geotechnical Engineering Services,  
and  
Environmental Site Assessment

CHINATOWN PARCEL B  
Boston, MA

December 13, 1990

Ref. File 608-90

PREPARED FOR:

Asian Community Development Corp.  
360-B Tremont Street  
Boston, MA 02116

PREPARED BY:

Miller Engineering, Inc.  
P.O. Box 4776  
Manchester, NH 03108







# MILLER ENGINEERING, INC.

**Mail all correspondence to:**

100 SHEFFIELD ROAD • P.O. BOX 4776 • MANCHESTER, NEW HAMPSHIRE 03108 • TELEPHONE (603) 668-6016 • FAX (603) 668-8641

December 13, 1990

Ms. Carol Lee  
Executive Director  
ASIAN COMMUNITY DEVELOPMENT CORPORATION  
360-B Tremont Street  
Boston, MA 02116

Re: Geotechnical Engineering Services and  
21-E Environmental Site Assessment  
Chinatown Parcel B  
Boston, MA

Ref. File 608-90

Dear Ms. Lee:

In response to your letter dated December 5, 1990, Miller Engineering & Testing, Inc. (MET) is pleased to submit this proposal for Geotechnical Engineering and Environmental Site Assessment services for the above referenced project.

In preparation of this proposal we have visited the site and researched the subsurface conditions prevalent in the immediate area to define the scope of services in terms of boring depth requirements and site accessibility. Based upon our research, we anticipate fill potentially underlain by organic deposits to depths of 10 to 20 feet. Stiff clays gradually becoming softer with depth will likely underlie the organic deposits and fill for depths of up to 100 feet or more prior to encountering dense granular deposits and/or bedrock. Due to these conditions, undisturbed Shelby tube sampling techniques in the clayey soils, to facilitate laboratory strength and consolidation testing, and rock core will be required to define the subsurface conditions.



It is our understanding that the Parcel B development is being sponsored by the Asian Community Development Corporation (ACDC). The design, prepared by the architects Woo & Williams, proposes a central courtyard enclosed by residential structures of 10 stories on Washington Street and up to four (4) stories on Oak Street, Maple Place and the Parcel division line. Above-grade parking is currently planned off-site; however, if this plan proves not feasible, consideration would be given to a one-level below-grade parking garage.

The scope of services is described below followed by a presentation of the budget.

#### Subsurface Exploration

Utilizing our in-house drilling equipment, we propose a total of four (4) borings to depths of up to approximately 100 feet (two borings to 100 feet and two borings to 50 feet) at the locations shown on the attached Proposed Boring Location Plan. The actual depth of each borehole will be determined in the field by our resident engineer.

Drilling and sampling will be in accordance with all current applicable ASTM and professional standards. Where clayey, cohesive soils are encountered, thin-walled tube samples will be taken. Split-spoon samples will be taken at representative strata. Samples will be placed in sealed jars and labeled showing the boring number, sample number, sample depth, number of blows per six-inch increment required to drive the split spoon sampler, and sample recovery. Rock core will be obtained in one (1) borehole if deemed appropriate and placed in core boxes. In addition, field vane shear tests will be performed to correlate laboratory-determined shear strength parameters if deemed appropriate in the cohesive strata.



Utility companies (i.e., Dig-Safe) will be contacted prior to drilling. You will be notified before the drilling equipment is removed from the site as to subsurface conditions encountered.

All borings will be located, and performed under the full-time direction, of a resident geotechnical engineer.

Groundwater monitoring wells will be installed in each of the borings to obtain accurate water level readings and to facilitate groundwater sampling for the environmental site assessment. The well material will be steam cleaned in accordance with standard environmental practice and street box locking caps will be installed over the wells for protection.

#### Laboratory Testing and Geotechnical Engineering Report

Based upon the results of the subsurface exploration program, a geotechnical laboratory testing program will be established. Presently, we anticipate performance of the following tests on cohesive soil samples:

- 3 - Consolidation Tests
- 3 - Unconsolidated, Undrained Triaxial Shear Tests
- 10 - Atterberg Limit Determinations
- 10 - Water Content Determinations

The results of the subsurface exploration and laboratory testing program will be interpreted and summarized in a geotechnical engineering report. The engineering evaluation will focus on all viable foundation types, pointing out the advantages and disadvantages of each and the potential for use of multiple types of foundation systems within the parcel. The report will address a variety of foundation types including, but not limited to, the following:



1. Pile Foundations
  - a. Friction Piles
  - b. End Bearing Piles
2. Mat Foundation Systems
3. Spread Footings (if appropriate for smaller buildings)

In addition, an inventory of adjacent existing building foundation systems will be performed to assess the impact of deep excavation (for parking structures or basements) and foundation construction activities, will have on these structures. It should be noted that if insufficient records exist as to the foundation details of adjacent building(s), it may be necessary to excavate test pits around these buildings at a later date to disclose foundation details. Design guidelines for temporary excavation support and de-watering systems will be presented.

#### Design Assistance Services

Miller Engineering, Inc. will be available to work closely with the architects and structural engineers during preparation of working drawings and construction specifications. This service will insure that proper integration of the geotechnical requirements has been incorporated into these documents for design and construction and that compliance with the Massachusetts State Building Code has been achieved.

Based upon discussions with John Williams of Woo & Williams, it is undecided whether foundations will be provided below the buildings at this time. Should it be feasible to utilize mat foundations which, based upon our research, have been used successfully on several buildings in the general vicinity of the project, basement space would be required for overburden stress relief. Due to this circumstance, there would be no significant difference in our investigation or report preparation whether this space was a basement area or an underground parking garage. Therefore, there will be no difference in the scope of services if a below-grade parking structure is required.





It is anticipated that the subsurface investigation can be completed within 10 working days after commencement and that the Geotechnical Report would be completed within 45 days of completion of all necessary field work.

## 21E Environmental Assessment

Miller Engineering, Inc. will prepare an environmental assessment on a parcel of property referenced as Chinatown Parcel B in Boston, Massachusetts. The request for proposal specifies that a Preliminary Assessment and a Phase I Limited Site Investigation be prepared in accordance with 310 CMR 40.00, Massachusetts Contingency Plan.

The objective of the site assessment is to evaluate the property with respect to the potential liability exposure as expressed in the Massachusetts General Laws, Chapter 21E.

Typically, the Preliminary Assessment and Phase I Limited Site Investigation are conducted on sites where there is evidence to indicate that the site has been impacted by a release of petroleum hydrocarbons or hazardous waste. The prescribed scope of work and reporting format facilitates the Massachusetts Department of Environmental Protection in classifying the site.

## Preliminary Assessment

The following work tasks are required to prepare the Preliminary Assessment:

- . a detailed inspection of the subject property
- . obtaining physical and historical information on the property
- . file research to review any past environmental violations
- . investigate for the presence of underground storage tanks
- . summarization of available site specific data



## Phase I Limited Site Investigation

The intent of the Phase I Limited Site Investigation is to build upon the information assembled in the Preliminary Assessment and to collect specific data on the site to confirm the environmental integrity of the property.

The following scope of work is proposed to prepare the Phase I Limited Site Investigation report. These investigations have been designed to integrate as much as possible, the field operations of the geotechnical investigation with the environmental assessment to prevent duplication of effort and to maximize utilization of engineering labor.

During the advancement of the geotechnical borings, soil samples will be obtained at discrete depth intervals and screened with a photo-ionization detector for presence of volatile organic compounds. We have included in our budget to analyze one soil sample per boring for the complete suite of Hazardous Substance List (HSL) volatile organic compounds and total petroleum hydrocarbons. These soil samples are typically taken at the 3.0 to 5.0-foot depth interval. If research during the Preliminary Assessment indicates that there is the potential that other contaminants than those proposed may be present, we will expand the analysis to include those compounds of concern.

Following completion of the geotechnical borings, four groundwater monitoring wells will be installed. The purpose of the wells is to determine groundwater elevation and flow direction and sampling for volatile organic compounds and hydrocarbons which may have impacted the site either via migration from adjoining properties or as the result of an on-site release.

Other tasks to be conducted include:



- . characterization of the geologic, hydrologic and hydrogeologic conditions of the site and surrounding properties
- . identification of all municipal and private water supplies in the area
- . identification of nearby surface water and environmentally sensitive receptors
- . documentation of any filling or excavating which may have occurred on the site
- . identification of other environmental concerns which may be germane to the site

#### Reports and Schedule

The Preliminary Assessment and Phase I Limited Site Assessment report will be in accordance with the prescribed Massachusetts Department of Environmental Protection format. We anticipate that the required research and preparation of the Preliminary Assessment will be completed within 15 working days following authorization to proceed. The Phase I Limited Site Investigation will take an additional 30 days.

With reference to the Professional Liability Insurance requirement within your request for proposal, please be advised that our current limit is \$250,000.00 with a \$25,000.00 deductible for each claim. We can purchase a rider to obtain \$1,000,000.00 coverage; however, the cost for this additional amount is extremely expensive and would be reflected in our costs for services for this project.

Miller Engineering, Inc. has recently completed a Geotechnical Evaluation and Environmental Site Assessment for the proposed Chestnut/Lamartine Family Housing project in the Jamaica Plain section of the City for the Urban Edge Housing Corporation. Our contact at Urban Edge was Ms. Fran Price.

A budget has been prepared based upon the scope of services previously outlined as follows:



## BUDGET

### I. Subsurface Exploration and Geotechnical Engineering

A.	Furnish all equipment, drill crew, field engineer, 5'-0" of rock core, well materials with locking cap, steam cleaning equipment, and perform all work described above	\$ 18,945.00
B.	Geotechnical Laboratory Testing	\$ 3,840.00
C.	Geotechnical Engineering Report	\$ 9,750.00
D.	Geotechnical Design Assistance Estimated at 60 hours @ \$65.00 per hour	\$ <u>3,900.00</u>
	Total	\$ 36,435.00

### II. Environmental Assessment Services

A.	Preliminary Assessment	\$ 2,500.00
B.	Phase I Limited Site Investigation	
1.	Monitoring Well Sampling & Analysis	\$ 2,700.00
2.	Environmental Engineering; Research and Report Preparation	\$ <u>3,900.00</u>
	Total	\$ 9,100.00

Enclosed in the Appendices are Contract Terms and Conditions, Company Background and Qualifications, and resumes of principal personnel which will be assigned to this project.

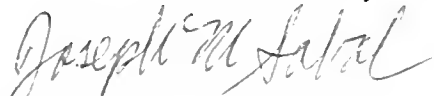




We thank you for this opportunity to be of service to you. If all of the foregoing meets with your approval, we would appreciate your acknowledgement by signing the enclosed copy of this proposal and returning it to us for our files.

Very truly yours

MILLER ENGINEERING, INC.



Joseph M. Sobol, P.E.  
Senior Geotechnical Engineer



David H. Foster  
Director of Environmental  
Services

JMS:paz

Date: \_\_\_\_\_ For: \_\_\_\_\_  
(Company)

Accepted  
by: \_\_\_\_\_  
(Signature) (Address)

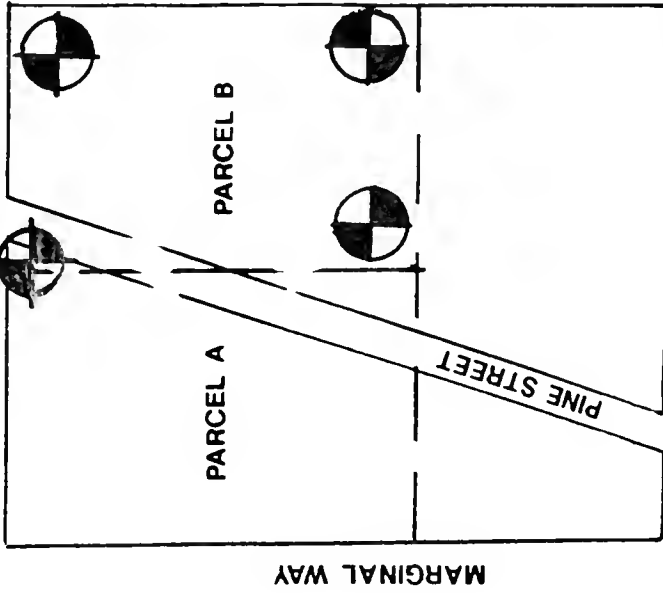
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(Typed Name & Title)







WASHINGTON STREET



PARCEL A

PARCEL B

PARCEL C

MARGINAL WAY

OAK STREET

ASH STREET

NASSAU STREET

HARRISON AVE.



NOT TO SCALE



PROJECT : CHINATOWN PARCEL B

BOSTON, MA.

PROJECT No : \_\_\_\_\_

DATE : \_\_\_\_\_ DECEMBER, 1990

PROPOSED BORING

LOCATION PLAN









## TERMS AND CONDITIONS

Please be advised that subsurface conditions may vary from those observed at locations where explorations are made; and that site conditions may change with time. Data, interpretations, and recommendations by us will be based solely on information available to us. We are responsible for those data, interpretations and recommendations; but we will not be responsible for other parties' interpretations or use of the information developed.

Our services will be conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the geotechnical engineering profession practicing contemporaneously under similar conditions in the locality of this project. Under no circumstances is any warranty, expressed or implied, made in connection with the providing of geotechnical engineering services.

You will obtain free access to the site for all equipment and personnel necessary for us to perform the work set forth in this proposal. We will take reasonable precautions to minimize damage to the site; but it is understood by you that, in the normal course of work, some damage may occur and the correction of such damage is not part of this proposal.

We will dispose of all remaining soil and rock samples sixty (60) days after submission of our report covering these samples. Further storage or transfer of samples can be made at your expense upon your prior written request.

Hazardous materials and/or other unknown conditions may exist at the site where there is no reason to believe that they could or should be present. We will notify you immediately when unanticipated conditions are discovered as our initial scope of work will change thereby requiring additional costs.



This proposal for services has been prepared for you as our client. If payment for our services, in whole or part, is to be made by a third party; we must be so notified in writing prior to our commencing work.

Our invoice, when submitted to you, will be due and payable net within thirty days of date of invoice.







## COMPANY BACKGROUND AND QUALIFICATIONS

The following is brief synopsis of our company history, qualifications and experience which we trust will assist you in your selection of a consultant for this project:

Miller Engineering, Inc., founded in 1976, is an organization of approximately 85 professionals and support staff representing the field of hydrology, geology and geophysics, geotechnical and structural engineering, and materials testing. As one of New England's original geotechnical engineering firms, Miller Engineering, Inc. has over 13 years of progressive experience while conducting over 4,000 projects throughout the region.

Corporate headquarters are located in Manchester, New Hampshire with branch offices in Auburn, Maine and Northboro, Massachusetts. Each office is staffed with professional engineers and certified technicians, and is fully equipped with modern geotechnical testing equipment for performing field and laboratory investigations. In addition, the corporate headquarters office is equipped with a full range of environmental test equipment.

Our geotechnical engineering and environmental services departments are fully supported by in-house testing and drilling departments. Drilling equipment includes two and four-wheel drive truck-mounted rigs, all terrain track-mounted vehicles, and portable equipment capable of drilling, sampling, and installing monitoring wells to depths greater than 100 feet in unconsolidated sediments or bedrock. The drill rigs can be equipped for obtaining undisturbed soil samples, and rock cores, or for performing various in situ subsurface tests. Our geotechnical laboratory testing services include triaxial cell compression, consolidation, and permeability testing for use in foundation, slope and landfill studies. Our in-house subsurface exploration and testing capabilities eliminates the subcontracting of these services, thus retaining total control over scheduling, quality assurance, and management cost.





Our firm has performed geotechnical studies on many sites throughout the New England area for State agencies, municipalities and private industry. We have extensive experience in addressing a variety of soil conditions and a thorough knowledge of the typical properties of soils generally encountered throughout the area. We have developed foundation recommendations for the design of numerous deep and shallow foundation systems for buildings, tanks, towers, etc., and have provided field support during their construction.

Field engineers and drilling personnel have completed the OSHA 1910.120 40-hour Hazardous Waste Site Operations and Methods Course and have all necessary protective clothing and equipment through Level B.

We have extensive experience in the planning and implementation of hazardous waste management (HWM) programs for State, municipalities and industry. Studies have included environmental assessment and remediation of hazardous material migrating from CERCLA (Superfund) sites, underground storage tank contamination studies, and New Hampshire and Massachusetts Phase I groundwater contamination studies. Miller Engineering, Inc. has completed several hydrogeologic and closure studies for municipal landfills in New Hampshire, and is currently involved in ongoing groundwater monitoring at each site. Miller Engineering, Inc. is capable of providing services necessary for a complete landfill closure project.

Our environmental testing equipment includes volatile organic compound detectors and a gas chromatograph designed for field operations. In addition, we have the ability to conduct a variety of geophysical surveys suitable for environmental and geotechnical studies. We can also provide a full range of groundwater and soil sampling services.







RESUME OF: Joseph M. Sobol, P.E.  
Senior Geotechnical Engineer  
Miller Engineering, Inc.

EDUCATION: Worcester Polytechnic Institute  
1981 - B.S. Civil Engineering  
  
Northeastern University  
Master of Science  
Geotechnical Engineering  
(in progress) -

EXPERIENCE: Mr. Sobol has over nine years of experience in the fields of geotechnical and structural engineering and direction of subsurface exploration.

1987-Present Senior Geotechnical Engineer  
Miller Engineering, Inc., Manchester, NH.

Since joining Miller Engineering, Inc., Mr. Sobol has served as project manager for the following partial list of projects:

K Mart/Pace Membership Warehouse, Manchester, NH -  
Directed subsurface exploration and geotechnical report preparation for a 100,000 square warehouse facility.  
Directed construction earthwork operation which included excavation and replacement of over 50,000 cubic yards of unsuitable soils.

Super 8 Hotel, Manchester, NH - Directed subsurface exploration and geotechnical report preparation for a four-story hotel building. Geotechnical analyses include slope stability of a 50-foot high earth cut slope. Structural design of over 400 linear feet of reinforced concrete retaining walls. Provided consultations during construction.

St. Joseph's Hospital, Lowell, MA - Directed subsurface exploration and geotechnical report preparation for a six-story hospital building addition. Undulating bed-rock profile and poor rock quality necessitated design and construction modifications including drilled pier



foundation construction and drilled H-pile and lagging temporary retaining structures. Provided consultation during construction to Gilbane Building Company.

St. Joseph Hospital, Nashua, NH - Provided geotechnical and structural engineering services for design of a concrete retaining wall and structural enclosure of an existing cantilevered concrete deck for a mobile MRI facility.

Christa McAuliffe Planetarium, Concord, NH - Directed geotechnical report preparation detailing over-excavation of unsuitable soils and settlement analyses of underlying clayey silt deposit for the foundation design of the glass-domed planetarium structure.

Waste Management Office Building and Maintenance Facility, Londonderry, NH - Directed subsurface exploration, geotechnical report preparation, and construction earthwork operations for a 20,000 square foot building and associated parking, storage, and slope areas. Significant blasting of bedrock was required to prepare the foundation subgrade.

St. Paul's School Library, Concord, NH - Directed subsurface exploration, geotechnical report preparation and pile foundation installation for the three-story, stone masonry library building. Approximately 200 steel H-piles were driven to bedrock for foundation support.

Market Square Development, Newburyport, MA - Provided expert testimony concerning the unique features of the subsurface conditions to provide evidence required for a contested zoning variance court case.





Contel Telecommunications Towers - Directed geotechnical studies and report preparation for numerous self-supported and guyed towers in New Hampshire, Maine and Vermont.

Greenland Road Pedestrian Bridge, Portsmouth, NH - Directed geotechnical evaluation and structural design of the abutments and wingwalls for a 134-foot single-span, pre-fabricated, pedestrian bridge.

1985-1987      Project Engineer  
Hayden/Wegman, Inc., Consulting Engineers  
Boston, MA

Performed geotechnical and structural engineering and structural inspection of various water treatment and infrastructure projects.

Sullivan Square Interchange, Charlestown, MA - Structural inspection, preparation of plans, specifications and construction cost estimates for structural rehabilitation of the Sullivan Square Interchange.

Lynn Commercial Fish Pier, Lynn, MA - Directed subsurface and geotechnical evaluation for installation of 100 steel pipe piles; 200 feet in length, through soft clay to support a pre-stressed concrete fish pier.

1982-1985      Staff Engineer  
Goodkind & O'dea, Inc. Consulting Engineers  
Clifton, NJ

Performed geotechnical engineering and structural design for several State highway projects in New Jersey (Routes



I-195, I-287, and Route 522) and various municipal projects.

Responsibilities included layout of subsurface exploration plans, field supervision, preparation of roadway and bridge foundation reports, structural design of abutments, walls and bridge decks, supervision of drafting, design of rock anchorage systems, and sheetpile walls.

1981-1982      Staff Engineer  
Mueser, Rutledge, Johnston & DeSimone,  
Consulting Engineers  
New York, NY

Responsibilities included performance of comprehensive laboratory soils testing for such projects as Westway Highway, Washington Metro Subway and Fort McHenry Tunnel. Field Engineer for subsurface exploration programs at Battery Park City, and Fort McHenry Tunnel.

#### PROFESSIONAL

REGISTRATION: New Hampshire, No. 6890

MEMBERSHIPS: American Society of Civil Engineers, Member  
National Society of Professional Engineers, Member



RESUME OF: Frank K. Miller, Jr., P.E.  
Senior Geotechnical Engineer  
Miller Engineering, Inc.

EDUCATION: New England College  
1985 - B.S. Civil Engineering  
  
University of Lowell  
(in progress) - Geotechnical Engineering

EXPERIENCE:

- 1990 Russell Stover Candies Facility, Somersworth, NH -  
Performed geotechnical investigation and provided geotechnical support throughout construction. Provided recommendations for construction of rock fills for the structure and parking lots and subgrade stabilization which was of primary concern in the vicinity of natural springs.
- 1990 Merrimac Paper Courtyard Project, Lawrence, MA -  
Performed geotechnical study and provided geotechnical assistance during construction. A mat foundation was selected to support the heavily loaded two-story structure. The subgrade was prepared to accept the bearing pressures from the mat. Design of the mat was complicated by the presence of existing old mill buildings and penstocks existing beneath the building footprint.
- 1990 Walgreens Drug Store, Methuen, MA - Performed geotechnical study and provided geotechnical assistance during foundation construction. The presence of loose, miscellaneous fill and organic material overlying loose sands was the main consideration in the foundation evaluation for this project. Pressure-Injected Footings (PIF's) was selected as the most economical foundation system.



- 1989      Union Leader Headquarters, Manchester, NH - Provided geotechnical engineering support throughout construction. Evaluation of foundation subgrade and providing recommendations for achieving adequate bearing capacity were the main concerns.
- 1989      Highpoint Facility, Tewksbury, MA - Performed geotechnical investigation and provided geotechnical support throughout construction of four structures and associated parking facilities. Main geotechnical issues focused on the removal of unsuitable materials, construction de-watering, and subgrade stabilization.
- 1989      New England Sheet Metal, Goffstown, NH - Performed geotechnical study and provided geotechnical support during construction. A deep foundation system consisting of H-piles was selected to by-pass unsuitable soils. Vertical, as well as horizontal, forces due to crane loads had to be considered in the foundation design.
- 1988      Elliot Hospital Medical Office Building and Parking Garage, Manchester, NH - Supervised geotechnical study prior to construction and provided geotechnical engineering support throughout construction. Construction of deep fills and removal of unsuitable materials were key geotechnical issues.
- 1988      St. Joseph Hospital Medical Office Building and Parking Garage, Nashua, NH - Performed geotechnical investigation and provided geotechnical assistance during construction. Key geotechnical issues were with the removal of unsuitable materials and evaluation of subgrades for spread footing foundation.





- 1988      Bronx Business Park II, Marlborough, MA - Provided geotechnical study. Location of old fill and organic deposits known to exist at site were top concerns to assure that the six-story structure was placed over the most favorable portion of the site.
- 1988      25 and 27 Otis Street Development, Westborough, MA - Performed geotechnical studies and provided geotechnical assistance during construction. Large cut and fill operation required careful control to assure adequate placement of moisture sensitive soils for foundations and pavements.
- 1987      Hillsborough County Correctional Facility, Manchester, NH - Supervised geotechnical investigation and provided geotechnical support throughout construction. Large scale proofrolling of subgrades, excavation and replacement of loose sands and construction de-watering were key geotechnical issues.
- 1987      Northwood Business Park, Danvers, MA - Performed geotechnical study and provided geotechnical assistance during construction of a 12-story and a one-story structure. Evaluation of materials to be used in engineered fills and evaluation of the adequacy of subgrades for foundations were the main considerations.
- 1987      Dartmouth Commons Development, Manchester, NH - Performed geotechnical study and provided geotechnical support during construction of two (2) three-story structures and one (1) two-story structure. Loose sands and silts had to be precompressed prior to construction of the two-story structure, and unsuitable materials and de-watering were main concerns during the construction of the three-story structures.



PROFESSIONAL

REGISTRATIONS: New Hampshire, No. 7337

MEMBERSHIPS: 1985-Present: American Society for Civil Engineers  
Associate Member



RESUME OF: Arthur W. Rose, P.E.  
Senior Vice President  
Miller Engineering & Testing, Inc.

EDUCATION: Wentworth Institute of Technology, Boston, MA  
1958 - Associate Degree, Architectural Engineering

EXPERIENCE:

1986 - Present	Senior Vice President Miller Engineering & Testing, Inc. Manchester, NH
1981 - 1986	Vice President, Structural Services Miller Engineering & Testing, Inc. Manchester, NH
1978 - 1981	Partner Rose, Goldberg, Mitsui & Associates Engineers and Architects Manchester, NH
1972 - 1978	President Rose, Goldberg & Associates Consulting Engineers Manchester, NH
1965 - 1972	General Manager Albert, Goldberg & Associates Consulting Engineers Manchester, NH
1960 - 1965	Design Engineer Albert, Goldberg & Associates Boston, MA
1958 - 1960	Design Engineer Tracy & Reynolds Boston, MA

PROFESSIONAL  
REGISTRATION: New Hampshire, Connecticut, Maine, Vermont,  
Massachusetts, Rhode Island, and Colorado



RESUME OF:

Arthur W. Rose, P.E. (continued)

MEMBERSHIPS: National Society of Professional Engineers  
American Arbitration Association  
Panel of Arbitrators  
American Institute of Architects  
Professional Affiliate, NH Chapter  
Construction Specifications Institute  
Charter Member - Past President, NH Chapter  
Consulting Engineers of New Hampshire  
Charter Member, President, 1984 to 1986  
Building Code Board of Appeals  
Goffstown, NH, Chairman  
Director - National Council  
Wentworth Institute of Technology





RESUME OF: David R. Ray  
Senior Hydrogeologist  
Miller Engineering, Inc.

EDUCATION: University of Texas  
1981 - Doctoral Studies

University of Texas  
1981 - M.S. Geology

University of Massachusetts  
1978 - B.S. Geology

EXPERIENCE:

Present Senior Hydrogeologist, Miller Engineering, Inc.,  
Manchester, New Hampshire

In position of Senior Hydrogeologist, Mr. Ray's responsibilities are as Project Manager or Principal Investigator to perform hydrogeological field investigations, groundwater contamination studies, underground storage tank investigations, remediation design, and environmental site assessments to meet Superlien regulations for property transfers.

1987 Consulting Hydrogeologist, Quest Environmental Sciences,  
to Inc., Manchester, New Hampshire.  
1989

Named as Project Manager or Principal Investigator, Mr. Ray performed hazardous waste site investigations, groundwater contamination studies, remedial design for groundwater and soil contamination, underground storage tank investigations, and conducted various levels of environmental site assessments to meet State Superlien regulations for real estate transfers. The following is a partial list of projects:

- . Hydrogeological Study of Springfield Landfill, Springfield, VT (Project Manager)
- . Subsurface Investigation of Lowell Landfill, Lowell, MA (Project Manager)
- . Gasoline Contamination Delineation and Remedial Design for Mobil Station (client confidential) Plymouth, NH (Project Manager)
- . Gasoline Contamination Delineation and Remedial Design for Agway Station (client confidential) Plymouth, NH (Project Manager)
- . Hydrogeologic Investigation of Rye and Coakley Landfill, North Hampton, NH (Project Manager)



RESUME OF: David R. Ray (continued)

EXPERIENCE: (continued)

- . Environmental Site Assessments for Real Estate Transfers throughout New Hampshire, Vermont, and Massachusetts (Principal Investigator)
- . Groundwater Contamination Studies and Environmental Auditing for General Electric Facility, Somersworth, NH (Principal Investigator)
- . Hydrocarbon Contamination Delineation and Remedial Design for The Henry Hanger Company, Nashua, NH (Principal Investigator)
- . Hydrogeological Investigation for Various Wood Chipping Facilities throughout New Hampshire and Maine (Project Manager)

1986  
to  
1987

Environmental Consultant, Roy F. Weston, Inc.

Responsibilities involved assessment, remediation and technical documentation of hazardous waste sites for the U.S. E.P.A. Region I. A partial list of representative projects include:

- . Assessment and Delineation of Solvent Plume and Bedrock Aquifer Characterization for Linemaster Switch Corporation, CT (Field Investigator)
- . Assessment Sampling and Technical Documentation of 500 Drums of Unknown Chemical Waste, Rolfite Chemical Company, Shelton, CT (Field Investigator)
- . Groundwater Contamination Investigation to Evaluate Impact of Leaking Transmission Cables for Boston Edison, Waltham, MA (Field Investigator)

1981  
to  
1986

Exploration Geologist, Texaco, Inc.

Responsibilities involved aquisition and interpretation of geological and geophysical data for evaluation of hydrocarbon prospects in various sedimentary basins throughout Africa, South America and Central America.



RESUME OF: David R. Ray (continued)

ADDITIONAL

STUDIES: Technical Seminars on RCRA and SARA Regulations, OSHA Health and Safety Training, Underground Storage Tanks, Interpretation of Remote Sensing Imagery, Geophysical Field Techniques, Fluid Dynamics, Petrophysical Computer Analysis, and Electric Log Analysis.

PROFESSIONAL

AFFILIATIONS:

- . Geological Society of America
- . American Association of Petroleum Geologists
- . Association of Groundwater Scientists and Engineers
- . Society of Economic Geologists



RESUME OF: Steven W. Youngs  
Senior Hydrogeologist  
Miller Engineering, Inc.

EDUCATION: College of William and Mary  
1978 - B.S. Geology  
  
Washington State University  
1981 - M.S. Structural Geology  
  
University of Wisconsin  
1988 - M.S. Water Resources Management

EXPERIENCE:

1988 Senior Hydrogeologist, Miller Engineering, Inc.,  
to Manchester, New Hampshire.  
Present

In position of Senior Hydrogeologist, was named as project manager or principal investigator to perform hydrogeologic field investigations, groundwater modeling, gas chromatography field analysis or storm water planning for the following partial list of projects:

- . Hydrogeologic Study of the Town of Goffstown Landfill, Pinardville, NH (Principal Investigator)
- . Hydrogeologic Study of the Town of Chester Landfill, Chester, NH (Principal Investigator)
- . Concord Waste Recovery Facility, Penacook, NH (Hydrogeologic Consultant)
- . Hydrocarbon Contamination Delineation Study, Derry Bank Property, Derry, NH, Gas Chromatography Field Studies (Project Manager)
- . Hydrocarbon and Solvent Waste Contamination Delineation Studies at PSNH Hillsboro Facility, Gas Chromatography Field Studies (Principal Investigator)
- . Storm Water Control Studies for Cooks' Corners Shopping Center in Brunswick, Maine; and Meadows Condominiums, in Freeport, Maine (Project Manager)
- . Environmental Site Assessment/Contaminant Migration Study, Lowell Iron & Steel Property, Lowell, MA (Co-investigator and Hydrogeologic Consultant)
- . Soil Gas Survey, Contamination Delineation Study, Pine Street Canal Superfund Site, Burlington, VT (Project Manager)





RESUME OF: Steven W. Youngs (continued)

EXPERIENCE: (continued)

- . Gasoline Spill Remediation, E. Derry Road, Derry, New Hampshire (Project Director)
- . East Derry Lincoln Site, Derry, NH, Remediation Design and Analysis of Gasoline Contaminated soil and Groundwater (Project Manager)

1987 Wisconsin Department of Natural Resources, Bureau  
to of Fisheries Management and Bureau of Solid Waste  
1988 Management.

- . Wisconsin Landfill Monitoring Network Survey  
(Principal Investigator)

1983 University of Wisconsin, Department of Geology and  
to Chemistry  
1986

1980 U.S. Forest Service, Nezperce National Forest, Idaho  
to  
1981

1978 Washington State University, Geology Department  
to  
1980

#### ADDITIONAL STUDIES:

1989 OSHA 1910.120 40-hour Hazardous Waste Site Operations  
Course

1988 Photovac Gas Chromatograph Standard Operations and  
Methods Course.

1988 Hydrogeologic Field Methods, 3-Week Intensive Course,  
University of Wisconsin, Madison.

1983 Course Work and Research Toward Ph.D., Economic Geology,  
to University of Wisconsin, Madison. Research Topic:  
1986 Geology of the Meme' Skarn, Haiti. Completed Chemistry  
Minor, including instrumental analysis methods.

1978 Geologic Field Camp, North Carolina State University,  
Summer Field Camp in New Mexico.



RESUME OF: Steven W. Youngs (continued)

MEMBERSHIPS: Society of Groundwater Scientists and Engineers.

National Water Well Association



RESUME OF: Richard J. Eichhorn  
Geologist  
Miller Engineering, Inc.

EDUCATION: University of New Hampshire  
Major: Applied Geophysics  
1990 - M.S. Geology  
  
Keene State College  
Major: Earth Science  
Minor: Physics  
1984 - B.S. Earth Science

EXPERIENCE:

1988  
to  
Present

Geologist, Miller Engineering, Inc., Manchester, NH.

In position of Geologist, has had assignment of Project Manager or Principal investigator utilizing five years of experience in New England geological and geophysical studies; which include fracture trace analyses; magnetometer, resistivity and seismic surveys; and landfill closure and hazardous waste studies; in the following partial list of projects:

- . Town of Goffstown, Goffstown Landfill Hydrogeologic Study (Project Manager and Principal Investigator)
- . Town of Chester, Chester Landfill Hydrogeologic Study (Consulting Geologist)
- . Construction Consultants, Inc., Lowell Electric, Massachusetts Contingency Plan Phase I - Limited Site Investigation (Consulting Geologist)
- . Southern New Hampshire Stone Quarry Site Feasibility Study (Consulting Geologist)
- . Environmental Site Assessment/Contaminant Migration Study, Lowell Iron & Steel, (Project Manager and Principal Investigator)
- . Riley Enterprises Inc., Fieldstone Plaza Foundation Design (Consulting Geologist)
- . St. Joseph's Hospital, Foundation Design Engineering (Consulting Geologist)



RESUME OF: Richard J. Eichhorn (continued)

EXPERIENCE: (continued)

- . Union Leader Facility, Foundation Design Engineering (Consulting Geologist)
- . Warner Cable Tower, MCI Tower, Contel Cellular, Inc. Tower, Merrimack Cellular One Tower, Weare Contel Cellular, Inc. Tower (Consulting Geologist)
- . Soil Gas Survey, Contamination Delineation Study, Pine Street Canal Superfund Site, Burlington, VT (Principal Investigator)
- . Soil Resistivity Survey, South Weymouth Naval Air Station, South Weymouth, MA (Geophysicist)
- . Confidential Client, Somerville, MA, Massachusetts Contingency Plan Phase I - Limited Site Investigation, Phase II - Comprehensive Site Assessment in Progress. (Principal Investigator)
- . Seismic Refraction Survey, Auburn Landfill, Auburn, NH (Geophysicist)

1987 D.L. Maher, Inc.

Conducted magnetometer surveys and fracture trace analyses for locating high-yield water wells for Blueberry Hill Country Club Water Supply (Geophysicist)

1985 Mineral Management Service and the University of New  
to Hampshire  
1986

Organized and supervised cruises to collect seismic reflection data and core samples of off-shore glacial deposits. (Geologist)

ADDITIONAL  
STUDIES:

1986 Geophysical Study of Structures in the Nonesuch River Fault  
to Zone, Southwestern Maine and Southern New Hampshire (Masters  
1989 Thesis)

1989 OSHA 1910.120 40-hour Hazardous Waste Site Operations  
Course





RESUME OF: Richard J. Eichhorn (continued)

ADDITIONAL  
STUDIES: (continued)

- 1988 Photovac 10S70 Gas Chromatograph Standard Operations and Methods Course
- 1984 Southeast Missouri State University Geology Field Camp, Utah, Arizona, and Nevada.

MEMBERSHIPS:  
American Geophysical Union  
Geological Society of America



RESUME OF: David H. Foster  
Director of Environmental Services  
Miller Engineering, Inc.

EDUCATION: University of New Hampshire  
1976 - B.S. Geology/Hydrology  
  
Duke University  
1977 - Graduate Studies: Marine Geology  
  
U.S. Fish & Wildlife Service  
Instream Flow Incremental Methodology (IFIM)  
1983 - Courses in Scope and Design  
1984 - Field Methods  
  
Massachusetts Institute of Technology  
1981 - Groundwater Hydrology, ASCE Short Course  
  
1969 - U.S. Coast Guard Electronics School

EXPERIENCE: Mr. Foster has over 12 years of environmental consulting experience in the field of geological and hydrological investigations. His areas of expertise include dye studies, dispersion and transport phenomena, coastal engineering design criteria, beach and coastal sediment dynamics and geology.

1988 The Upjohn Company; Quinnipiac River (CT) Dispersion Study; Project Manager and Principal Investigator.

1988 Stearns and Wheeler Engineering; Seabrook (NH) Sewage Treatment Facility Environmental Studies; Project Manager and Principal Investigator.

1987 McComas Associates, Inc.; Badgers Island (ME) Geophysical Studies; Project Manager.

1987-1988 NH Department of Transportation, Conway Route 16 Project; Principal Investigator.

1985 Bechtel Civil and Minerals, Inc.; Schuylkill River (PA) Dispersion and Transport Studies; Project Manager. Managed and conducted dye dispersion and riverine transport study along a 40-mile reach of the Schuylkill River to assess impact of the Limerick Nuclear Power Stations thermal discharge on water quality.

1986 E.C. Jordan Engineers, Great Diamond Island (ME) Ocean Sewage Outfall Dispersion Study; Project Manager and Principal Investigator. Conducted investigations and prepared testimony in support of outfall location and determination of effluent dispersion patterns.



RESUME OF: David H. Foster (continued)

EXPERIENCE:

- 1986      The Sherburne Corp Wasteload Assimilation Studies and Water Quality Studies, Ottauquechee River (VT); Principal Investigator. Conducted investigations to determine wasteload assimilation capacity of the Ottauquechee River to accept secondarily treated effluent from a proposed discharge. Field studies included time-of-travel measurement and determination of reoxygenation rates using propane and dye injection techniques.
- 1985-1986      Central Maine Power Co.; Asiscohos Dam IFIM Studies (ME); Principal Investigator. Study involved aquatic and hydrologic assessment using Instream Flow Incremental Methodology (IFIM) modeling techniques for determination of a acceptable low flow releases from a hydroelectrical generating facility.
- 1985      Central Maine Power Co.; Hiram Instream Flow Studies (ME); Principal Investigator. Investigation of minimum flow release from hydroelectric facility included both application of IFIM modeling techniques for fisheries habitat assessment and hydrologic studies.
- 1984-1985      Hudson River (NY) PCB Reclamation Project; Project Manager. Surveyed PCB hot spots in Upper Hudson River for the New York State Department of Environmental Conservation to define the distribution of contaminated sediments to allow the development of plans for removing the most highly contaminated areas.
- 1982-1986      Sears Island (ME) Marine Cargo Terminal; Principal Investigator. Conducted geophysical, hydrographic and sedimentological investigations for engineering design criteria and environmental assessment of proposed major dry cargo facility.
- 1984      Hillsborough Mills (NH) Hydroelectric Project; Consulting Hydrologist. Determined instream flow needs and successfully negotiated a minimum flow requirement.
- 1981-1982      Lake Ontario (NY) Shoreline Protection Study; Project Manager. Managed a review of erosion conditions along the entire U.S. Lake Ontario shoreline for the U.S. Army Corps of Engineers. Historical aerial photography was used to document erosion/sedimentation trends over a 50-year period. Conceptual remedial measures were proposed.



RESUME OF: David H. Foster (continued)

EXPERIENCE:

- 1984 Androscoggin River (ME) Water Quality Modeling Study; Principal Investigator. Conducted sedimentological and water quality studies including determination of time-of-travel using fluorometric techniques as input to water quality modeling.
- 1983-1985 Great Northern Paper Company, Hydroelectric Development Project (ME); Principal Investigator. Conducted FERC Exhibit E environmental studies in support of major new dam construction and impoundment. Extensive field investigations included water quality, hydrologic, geological and aquatic habitat studies.
- 1983-1984 Signal Companies; Peat Wet-Harvesting; Principal Investigator. Performed extensive assessment of water quality impacts resulting from a proposed full-scale peat harvesting operation which included the creation of 500-acre harvest ponds and the discharge of treated effluent either back to the wetlands or into a salmon-populated river.
- 1983-1984 Towns of Falmouth and Bourne, MA. Megansett and Squeteague Harbor Dredge Assessment Studies; Project Manager. Precondition hydrographic survey, environmental impact assessment and preparation of permit documents.
- 1981 New Hampshire Port Authority; NH Recreational Boating Study; Project Manager. Geophysical and sedimentologic investigations of selected harbors for future harbor expansion feasibility.
- 1981 Dorchester SEA-3 Products (NH); Hydrographic and Pre- and Post-Dredging Condition Surveys; Project Manager.
- 1979 Brown and Root, Inc. Proposed Cape Charles (VA) Marine Fabrication Facility Basin and Access Channel Dredging Project; Principal Investigator. Hydrographic and sediment transfer studies for engineering design criteria.
- 1980 Whitman and Howard Engineers, Scarborough (ME) Ocean Sewage Outfall Hydrographic (Bathymetry and Current) Study; Scientific Investigator. Assessment of outfall location and determination of effluent dispersions pattern.
- 1978 City of Portland (ME) Peaks Island 30th EPA Application for Waiver of Secondary Sewage Treatment Facilities; Scientific Investigator. Physical oceanographic, water quality, effluent dilution and advective modeling to document waiver application.





RESUME OF: David H. Foster (continued)

EXPERIENCE:

- 1980-1982 Power Authority of State of New York Hydrothermal Survey at East River (NY); Principal Investigator. Dye dispersion, thermal plume mapping, infra-red overflights, water quality and hydrological measurements to satisfy NPDES permit requirements.
- 1983 Niagara Mohawk Power Corporation, Dunkirk Steam Station, Lake Erie, (NY) Hydrothermal Modeling; Scientific Investigator. Defined the thermal plume for a range of ambient conditions in order to satisfy NY SPDES Discharge Permit requirements.

EMPLOYMENT HISTORY:

- 1988 Miller Engineering, Inc.
- 1977-1988 Normandeau Associates, Inc.
- 1977 New Hampshire Extension Service

MEMBERSHIPS:

Society of Economic Paleontologists and Mineralogists  
Geological Society of America

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